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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

### Office Action Summary

**Application No.**

10/717,273

**Applicant(s)**

WAN ET AL.

**Examiner**

JUAN C. OCHOA

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**Period for Reply** -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 22 January 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-30 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 9, 10, 19 and 20 is/are allowed.
- 6) ☒ Claim(s) 1-8, 11-18 and 21-30 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/S508)
- 4) ☐ Interview Summary (PTO-413)
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_
- Paper No(s)/Mail Date \_\_\_\_\_

### **DETAILED ACTION**

1. Applicant's arguments filed on 1/22/08 have been fully considered. Claims 1–30 are presented for examination.

### ***Claim Objections***

2. Claims 6, 7, 16, 17, 26, and 27 line 2 refer to the term "more accurate". Term may raise indefiniteness issues. The term "more accurate" is a relative term.
3. No new matter may be introduced in the required correction.

### ***Claim Rejections - 35 USC § 112***

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:  

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter, which the applicant regards as his invention.
5. Claims 11–18 and 21–28 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.
6. As to claim 11, lines 9-13 recite "traversing the internal body topology to identify a second element in a second wall side of the graphic model; measuring the distance between the first element and the second element; and storing a wall thickness, the wall thickness corresponding to the measured distance" After the first element is selected, the internal body can be traversed at varying angles. So the measured distance depends upon the angle taken to traverse the body. While a distance between the first element and second element is measured, the step of identifying a second element is

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not based upon a specific direction relative to the first element. Therefore, while the distance between the first element and second element is measured, that may not equate to a thickness of the wall. The claim only requires identifying a second element in a second wall, which may or may not correspond to the actual thickness of the wall. This renders the claim indefinite because the measured distance varies based upon an identified position of the second element.

7. As to claims 11, 21, they contain the same "measured distance depends upon the angle taken to traverse the body" deficiency as set forth above.
8. Dependent claims inherit the defect of the claim from which they depend.

#### ***Claim Rejections - 35 USC § 102***

9. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

10. Claims 1, 11, and 21 are rejected under 35 U.S.C. 102(e) as being anticipated by Onodera et al., (Onodera hereinafter), Pre-Grant publication 20040186604, (see PTO-892 Notice of Reference Cited dated 4/19/07).
11. As to claim 1, Onodera discloses a method comprising: loading a graphic model (see "graphic model" as "configuration model" in page 1, col. 2, paragraph [0008], lines 1–9); generating a surface mesh on the faces of the model (see page 6, col. 2,

paragraph [0070]); generating an internal body topology of the graphic model (see page 3, col. 1, paragraph [0027]), corresponding to the surface mesh; identifying a first element in a first wall side of the graphic model; traversing the internal body topology to identify a second element in a second wall side of the graphic model, wherein the traversing is performed on the shortest path between the first element and the second element (see "The face-to-face distance between the two (2) surfaces, which are registered in that pair-surfaces is calculated out, and the internal-surface model data 114 is given with this face-to-face distance between the surfaces, as an attribute of thickness of the target internal-surface model. Herein, if the pair-surfaces are in a plural number thereof, which belong thereto, an averaged value of the face-to-face distances between the surfaces is given as the thickness attribute, or the minimum one or the maximum one" in page 6, col. 1, paragraph [0065]); measuring the distance between the first element and the second element; and storing the measured distance (see "a value of plate thickness of the each target internal-surface model is calculated from the face-to-face distance between the surfaces in the pair-surface data" in page 3, col. 1, paragraph [0027], lines 9–11).

12. As to claim 11, Onodera discloses a data processing system comprising a processor and accessible memory (see page 1, col. 2, paragraph [0007]), the data processing system configured to perform the steps of: loading a graphic model (see "graphic model" as "configuration model" in page 1, col. 2, paragraph [0008], lines 1–9); generating a surface mesh on the faces of the model (see page 6, col. 2, paragraph [0070]); generating an internal body topology of the graphic model (see page 3, col. 1,

paragraph [0027]), corresponding to the surface mesh; identifying a first element in a first wall side of the graphic model traversing the internal body topology to identify a second element in a second wall side of the graphic model (see "The face-to-face distance between the two (2) surfaces, which are registered in that pair-surfaces is calculated out, and the internal-surface model data 114 is given with this face-to-face distance between the surfaces, as an attribute of thickness of the target internal-surface model. Herein, if the pair-surfaces are in a plural number thereof, which belong thereto, an averaged value of the face-to-face distances between the surfaces is given as the thickness attribute, or the minimum one or the maximum one" in page 6, col. 1, paragraph [0065]); measuring the distance between the first element and the second element; and storing the measured distance (see "a value of plate thickness of the each target internal-surface model is calculated from the face-to-face distance between the surfaces in the pair-surface data" in page 3, col. 1, paragraph [0027], lines 9–11).

13. As to claim 21, Onodera discloses a computer program product having instructions stored in a machine usable medium (see page 1, col. 2, paragraph [0007]), comprising: instructions for loading a graphic model (see "graphic model" as "configuration model" in page 1, col. 2, paragraph [0008], lines 1–9); instructions for generating a surface mesh on the faces of the model (see page 6, col. 2, paragraph [0070]); instructions for generating an internal body topology of the graphic model (see page 3, col. 1, paragraph [0027]), corresponding to the surface mesh; instructions for identifying a first element in a first wall side of the graphic model instructions for traversing the internal body topology to identify a second element in a second wall side

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of the graphic model and instructions for measuring the distance between the first element and the second element (see "The face-to-face distance between the two (2) surfaces, which are registered in that pair-surfaces is calculated out, and the internal-surface model data 114 is given with this face-to-face distance between the surfaces, as an attribute of thickness of the target internal-surface model. Herein, if the pair-surfaces are in a plural number thereof, which belong thereto, an averaged value of the face-to-face distances between the surfaces is given as the thickness attribute, or the minimum one or the maximum one" in page 6, col. 1, paragraph [0065]); and instructions for storing the measured distance (see "a value of plate thickness of the each target internal-surface model is calculated from the face-to-face distance between the surfaces in the pair-surface data" in page 3, col. 1, paragraph [0027], lines 9–11).

***Claim Rejections - 35 USC § 103***

14. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

15. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.

4. Considering objective evidence present in the application indicating obviousness or nonobviousness.
16. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).
17. Claims 2, 6, 7, 12, 16, 17, 22, 26, and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Onodera as applied to claim 1 above, taken in view of Balaniuk et al., (Balaniuk hereinafter), Pre-Grant publication 20030088389.
18. As to claim 2, while Onodera discloses graphic modelling, Onodera fails to disclose a 3D volume meshing internal body topology, tetrahedron-type topology.
19. Balaniuk discloses a 3D volume meshing internal body topology, tetrahedron-type topology (see col. 26, lines 10–17).
20. Onodera and Balaniuk are analogous art because they are both related to three-dimensional modeling.
21. Therefore, it would have been obvious to one of ordinary skill in this art at the time of invention by applicant to utilize the steps of Balaniuk in the method of Onodera because Balaniuk provides a static solution for elastic deformations of objects filled with



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incompressible fluid wherein the static solution provides globally and physically consistent deformations without pre-calculations or condensations (see paragraph [0023]), and as a result, Balaniuk reports the following improvements over his prior art: the 3D internal state inside a deforming medium can be modeled at any point from a reduced number of explicitly updated elements. The reduction in one order of magnitude of the number of elements enables the simulation of more complex objects with less computational effort. State-less deformations are estimated using only multiplications of matrices by vectors. The reduced number of elements further minimizes instability problems. (See paragraph [0155]).

22. As to claim 6, Balaniuk discloses a method wherein the mesh points are projected onto the faces to achieve accurate results. (See paragraph [0066]).

23. As to claim 7, Balaniuk discloses a method further comprising adding sampling points to the surface mesh for more accurate results. (See paragraph [0154]).

24. As to claims 12, 16, and 17 these claims recite a data processing system for performing the method of claims 2, 6, and 7. Onodera discloses a data processing system (see page 1, col. 2, paragraph [0007]) for performing a method that teaches claims 2, 6, and 7, therefore claims 12, 16, and 17 are rejected for the same reasons given above.

25. As to claims 22, 26, and 27, these claims recite a computer program product having instructions stored in a machine usable medium for performing the method of claims 2, 6, and 7. Onodera discloses a computer program product having instructions stored in a machine usable medium (see page 1, col. 2, paragraph [0007]) for

performing a method that teaches claims 2, 6, and 7, therefore claims 22, 26, and 27 are rejected for the same reasons given above.

26. Claims 3–5, 8, 13–15, 18, 23–25 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Onodera as applied to claim 1 above, taken in view of Duane R. Hixon, (Hixon hereinafter), U.S. Patent 7,359,841.

27. As to claim 3, while Onodera discloses graphic modelling, Onodera fails to disclose a 3D grid mapping internal body topology.

28. Hixon discloses a 3D grid mapping internal body topology (see col. 26, lines 10–17).

29. Onodera and Hixon are analogous art because they are both related to three-dimensional modeling.

30. Therefore, it would have been obvious to one of ordinary skill in this art at the time of invention by applicant to utilize the steps of Hixon in the method of Onodera because Hixon maps equations in space and time equivalently, avoiding the restriction of grid cells being required to have at least one face normal to the time axis (see col. 16, line 64 to col. 17, line 7), and as a result, Hixon reports the following improvements over his prior art: By removing the restrictions on the grid cell orientation, the grid points or cells can be distributed in such a way as to minimize the number of grid points or cells required to calculate an accurate solution in space-time; i.e. the total computational work can be reduced because local clustering of the grid cells will not impact the global grid spacing. Grid points can be locally clustered in space and time to resolve the

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smallest scales where they are present in the space-time volume, which can reduce the computational effort required to obtain a solution. (See col. 17, lines 8–25).

31. As to claim 4, Hixon discloses a traversal direction along the normal vector of the mesh element using the 3D grid mapping topology for efficient searching. (See col. 16, lines 18–23).

32. As to claim 5, Hixon discloses a traversal range guided by the normal vector of the mesh element and within a range of angles using the 3D grid mapping topology for efficient searching. (See col. 16, lines 18–23).

33. As to claim 8, Hixon discloses an internal body topology is represented as cubes, and is maintained by a tree structure to perform efficient searching.  
(see “cubes” as “blocks” in col. 22, line 63 to col. 23, line 3).

34. As to claims 13–15 and 18, these claims recite a data processing system for performing the method of claims 3–5 and 8. Onodera discloses a data processing system (see page 1, col. 2, paragraph [0007]) for performing a method that teaches claims 3–5 and 8, therefore claims 13–15 and 18 are rejected for the same reasons given above.

35. As to claims 23–25 and 28, these claims recite a computer program product having instructions stored in a machine usable medium for performing the method of claims 3–5 and 8. Onodera discloses a computer program product having instructions stored in a machine usable medium (see page 1, col. 2, paragraph [0007]) for performing a method that teaches claims 3–5 and 8, therefore claims 23–25 and 28 are rejected for the same reasons given above.

***Response to Arguments***

36. Applicant's arguments filed on 1/22/08 have been fully considered.
37. Regarding the claim objections, the amendment corrected all deficiencies and the objections are withdrawn.
38. Regarding the rejections under 112 second paragraph, the amendment to the claims 1–8 corrected their deficiencies. As to claims 11–18 and 21–28, claims remain defective.
39. Regarding the rejections under 101, the amendment to the claims 1–8 corrected their deficiencies. As to claims 11–18 and 21–28, claims remain defective.

***Conclusion***

40. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).
41. A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

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42. Examiner would like to point out that any reference to specific figures, columns and lines should not be considered limiting in any way, the entire reference is considered to provide disclosure relating to the claimed invention.

43. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Juan C. Ochoa whose telephone number is (571) 272-2625. The examiner can normally be reached on 7:30AM - 4:00 PM.

44. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Paul Rodriguez can be reached on (571) 272-3753. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

45. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/J. C. O./ 4/23/08  
Examiner, Art Unit 2123

/Paul L Rodriguez/  
Supervisory Patent Examiner, Art Unit 2123